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## Space Weather Forecast

Issued on Thursday, 03 August 2023 at 13:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

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**Space Weather Forecast Headline: R1-R2 Blackouts likely throughout. Coronal Mass Ejection effects anticipated Days 2-4 (4th-6th Aug) with a chance of Minor Storms.**

### Analysis of Space Weather Activity over past 24 hours

**Solar Activity:** Moderate solar activity with occasional Moderate flares, peaking at M2.0 at 03/1147 UTC. There are now nine numbered and one un-numbered sunspot regions on the visible disc. The largest region remains in the southwest, any changes to classification becoming increasingly difficult to discern as it approaches the limb. The elongated area in the northeast continues to see some slight development, but remains magnetically fairly simple. The newly numbered region emerging in the southeast remains large but tentatively simple, though some suggestion that further complexity may be yet to emerge. The other regions appear stable and have shown little change. A full-halo Coronal Mass Ejection (CME) was observed leaving the Sun on the 2nd, this is expected to arrive at Earth late on the 5th or early on the 6th. Also, two eruptions late on 31 Jul (and observed on imagery early 01 Aug) are considered to have Earth-directed components arriving on the 4th or 5th.

**Solar Wind / Geomagnetic Activity:** The solar wind was at mostly slow-ambient levels. The total interplanetary magnetic field strength (Bt) was at weak to moderate levels with a peak of 12nT at 02/0412 UTC, and signs of an increase once again from 03/1000 UTC. The important north-south component was also weak to moderate with a more prolonged southward directed orientations after 02/0400 UTC. Geomagnetic activity was generally Quiet (Kp 1-2), but with Active intervals 02/1200-1800 UTC.

**Energetic Particles / Solar Radiation:** The observed count rate of energetic particles (high energy protons) was at background levels throughout.

### Four-Day Space Weather Forecast Summary

**Solar Activity:** Activity is expected to be Moderate, with a slight chance of High, most likely in the short term from the complex region on the southwest disc. Other regions contribute to the flare risk, including a recently emerged region in the southeast.

**Solar Wind / Geomagnetic Activity:** Two CMEs may give glancing blows on Day 2 (4th Aug), but possibly into Day 3 (5th Aug). A higher confidence CME expected to impact Earth into day 3 or early day 4 (6th Aug). Solar winds at slow-ambient levels to start, perhaps becoming slightly elevated 400-500km/s into the period due to transient faster winds and potential CME influence. Low confidence in details. Geomagnetic activity is expected to be Quiet to Unsettled (Kp0-3) on day 1 (3rd Aug), becoming Unsettled to Active with a chance of G1/Minor Storm intervals from late Day 2 into Day 4.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles is likely to remain at background levels. There is a slight chance of further enhancements from any larger flares

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that occur, mainly from the complex region in the southwest in the near term.

## Geomagnetic Storms:

| Geo-Magnetic Storm       | Level    | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|--------------------------|----------|------------------------|-------------------|-------------------|-------------------|-------------------|
| Probability (Exceedance) |          |                        | (%)               | (%)               | (%)               | (%)               |
| Minor or Moderate        | G1 to G2 | No                     | 10                | 30                | 30                | 30                |
| Strong                   | G3       | No                     | 1                 | 5                 | 5                 | 5                 |
| Severe                   | G4       | No                     | 1                 | 1                 | 1                 | 1                 |
| Extreme                  | G5       | No                     | 1                 | 1                 | 1                 | 1                 |

## Radio Blackouts - X Ray Flares:

| X Ray Flares | Level         | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|--------------|---------------|------------------------|-------------------|-------------------|-------------------|-------------------|
| Probability  |               |                        | (%)               | (%)               | (%)               | (%)               |
| Active       | R1-R2 M Class | Yes                    | 70                | 65                | 60                | 60                |
| Very Active  | R3 to R5 X    | No                     | 10                | 10                | 5                 | 5                 |

## Solar Radiation Storms - (High Energy Protons):

| Radiation Storms         | Level (cm <sup>-2</sup> sr <sup>-1</sup> s <sup>-1</sup> ) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|--------------------------|------------------------------------------------------------|------------------------|-------------------|-------------------|-------------------|-------------------|
| Probability (Exceedance) |                                                            |                        | (%)               | (%)               | (%)               | (%)               |
| Active                   | ≥ S1                                                       | No                     | 10                | 10                | 10                | 10                |
| Very Active              | ≥ S3 *                                                     | No                     | 1                 | 1                 | 1                 | 1                 |

\* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm<sup>-2</sup>sr<sup>-1</sup>s<sup>-1</sup>)